

**EM214 ELEMENTS OF MATERIALS SCIENCE**  
**SPRING SEMESTER 2001**

**Course Textbook: The Science and Engineering of Materials**  
**D.R. Askeland, Third Edition, 1994 PWS-KENT**

<u>DATE</u>	<u>TOPIC(S)</u>	<u>READING</u>	<u>PROBLEMS</u>
Week of 1/8	Introduction Atomic Structure, Crystal Structure	Chapter 1 Chapter 2 Chapter 3	1: 5,6,12,13 2 : 2,17,22,23 24
1/15	No Class/Holiday Crystal Structure Crystal Structure Lab	Chapter 3 QUIZ 1	3: 7,10,12,13
1/22	Crystal Defects Defects/Diffusion Diffusion	Chapter 4 Chapter 5	4: 7,13,18,20 22,27,32
1/29	Mech Properties Mech Properties Mech Properties Lab	QUIZ 2 Chapter 6	5: 3,8,10,15, 21,23
2/5	Mech Properties Cold Work Mech Props Lab/Demos	Chapter 7	6: 1,4,8,10,17,22 24,25
2/12	Cold Work/Annealing Review / <b>TEST ONE</b>	Chapter 7	7: 6,10,14,20,22
2/19	No Class/Holiday Solidification/Welding Solidification Movie	Chapter 8	8: 2,8,18,19
2/26	Solid Solutions Phase Diagrams Casting/Welding Demos	Chapter 9 QUIZ 3	9: 5,8,10,16,25,36
3/5	Phase Diagrams Cooling Curve Demo	Chapter 9	
3/9-18	Spring Break		
3/19	Dispersion Strengthening	Chapter 10	10: 4,9,12,16,20,27

<u>DATE</u>	<u>TOPIC(S)</u>	<u>READING</u>	<u>PROBLEMS</u>
3/26	Phase Transformations Ferrous Alloys Heat Treat Lab	Chapter 11 Chapter 12	11: 9,10,14,15,24 25,28
4/2	Ferrous Alloys Other Alloys	QUIZ 4 Chapter 13	12:1,5,8,12,20
4/9	Other Alloys Ceramics	<b>TEST TWO</b>	
4/16	Polymers Composites Composites Demo	Chapter 15 Chapter 16	As Assigned
4/23	Corrosion NDE Lab	Chapter 22 QUIZ 5	

UNITED STATES NAVAL ACADEMY  
Annapolis, Maryland

8 Jan 01

**To: EM214 Students**  
**From: EM214 Course Administrator**  
**Subj: COURSE OBJECTIVES AND POLICIES**

1. Introduction. This course is an introductory course in materials science and engineering. It involves the study of the structure and properties of materials and how these are interrelated and influenced by processing and the environment. The course concentrates predominantly on metallic materials but also discusses polymeric (plastic), ceramic, and composite materials.

2. Objectives.

- \* To develop an understanding of crystal structure and microstructure of engineering materials and how these influence the engineering properties of materials.
- \* To describe the mechanical properties of engineering materials which influence material selection decisions and to introduce the various testing methods for evaluating mechanical properties.
- \* To develop an understanding of how thermal and mechanical processing influence, and can be used to control, the microstructure and properties of engineering materials.
- \* To develop an understanding of how the environment can influence the structure and properties of engineering materials.
- \* To describe various types of material failure and to present procedures to avoid them.
- \* To demonstrate in the laboratory some of the more common basic tools used to characterize the structure and properties of engineering materials.

3. Format. The course consists of lectures, demonstrations, and laboratory periods. Reading, as assigned in the course schedule, is to be completed prior to the specified lecture. Homework assignments will be discussed below.

4. Requirements. Each student is expected to have a textbook, a stapler to staple homework assignment sheets together, a light green Engineer's Problem Solution Pad for homework assignments, and a calculator. Each student is to bring his/her textbook to class unless otherwise advised. Further requirements regarding homework assignments are discussed below. TO RECEIVE A PASSING GRADE, THE STUDENT MUST TURN IN ALL LAB AND HOMEWORK ASSIGNMENTS.

5. Homework Assignments. Homework assignments are required in order to reinforce the principles and techniques presented in the course.

Each student is expected to prepare his/her own homework assignments and is expected to fully state each problem and to fully and neatly develop the answer to each problem. The first page must include each student's name, section, and the problems for the specific assignment.

Most assignments will require multiple pages and these must be stapled together. The assignments for the semester are given in the course schedule. Individual instructors may modify one or more of these assignments and will give information at the beginning of the class regarding due dates for homework and their policy on grading assignments handed in after the due date. The tests and final exam, which account for most of the final grade as described below, will predominantly involve problems and concepts encountered in the assignments.

6. Tests and Quizzes. Two single period tests are indicated on the course schedule. The final exam will be common for all sections of the course. Quizzes may also be given at the discretion of the individual instructors. Students must advise the instructor about expected absences from tests and announced quizzes. The policy regarding make-up tests is at the discretion of the individual instructors and each will advise their respective classes of the policy.

7. Extra Instruction. Extra instruction should be arranged on an individual basis with the instructor. Students are expected to arrive at EI sessions with specific problems and/or questions.

8. Grading. The final course grade will be determined as follows:

- 60% from tests and quizzes
- 15% from homework and laboratory assignments
- 25% from the final examination

9. Honor. Your individual instructor will advise you on his/her own policy regarding possession of the work of other midshipmen. The following items must be adhered to by all students in this course:

a. Homework must be your own work. You may get help in solving problems from other midshipmen or instructors by getting an explanation, working through a problem together, or examining another person's solution to understand the approach then working through the problem yourself. Merely copying another person's solution is cheating and an honor offense.

b. Lab assignments must be your individual work. Any assistance which you have obtained must be clearly annotated on the report. Use of another midshipmen's report as a basis for your own is cheating and an honor offense.

c. Tests and quizzes are closed book closed notes unless otherwise advised by the individual instructors. A programmable calculator may not be preprogrammed for use on an exam or quiz.

Copying an answer from another person is cheating and an honor offense.

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